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EXAMINER
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LUU, CUONG V

ART UNIT	PAPER NUMBER
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2128

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/653,829

Applicant(s)

CULLICK ET AL.

Examiner

CUONG V. LUU

Art Unit

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**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period **will** apply and **will** expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply **will**, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 December 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3,7,9,10,12,13,15-21,23-25,27-31,42,44,45,48 and 49 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3, 7, 9-10, 12-13, 15-21, 23-25, 27-31, 42, 44-45, and 48-49 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claims 1, 3, 7, 9-10, 12-13, 15-21, 23-25, 27-31, 42, 44-45, and 48-49 are pending. Claims 4-6, 8, 11, 14, 22, 26, 32-41, 43, and 46-47 have been canceled. Claim 49 has been added. Claims , 3, 7, 9-10, 12-13, 15-21, 23-25, 27-31, 42, 44-45, and 48-49 have been examined. Claims , 3, 7, 9-10, 12-13, 15-21, 23-25, 27-31, 42, 44-45, and 48-49 have been rejected.

### ***Response to Arguments***

1. Applicant's arguments with respect to claims 1, 3-10, 12-13, 15-21, 23-31, 42, and 44-48 have been considered but are moot in view of the new ground(s) of rejection under U.S.C. 103(a).

### ***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

**Claims 13, 21, 31, 42, and 48 are rejected under 35 U.S.C. 101.**

2. Claims 13, 21, 31, 42, and 48 are rejected under 35 U.S.C. 101 because the claimed inventions are directed to non-statutory subject matter. These claims are drawn to an

abstract idea because they recites a series of steps that are not tied to any of statutory classes even though their preamble recites, "a computer-implemented method". These steps can still be interpreted as manually computed.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Begg et al. (Improving Investment Decision Using a Stochastic Integrated Asset Model, SPE 71414, SPE Annual Technical Conference and Exhibition, 9/2001) submitted by the Applicant in IDS, in view of Netemeyer et al. (U.S. Pub. 2002/0169785 A1) and Joshi et al.

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**(Techno—Economic and Risk Evaluation of a Thermal Recovery Project, March 1996,  
Prepared for Department of Energy, Under Contract DE-FG22-93BC14899).**

3. As per claim 1, Begg teaches a method comprising:

receiving user input selecting one or more simulation engines corresponding to a value chain (p. 5 col. 1 paragraph 2. In this paragraph Begg teaches executing a simulation engine to run a simulation based on model which is built on parameters. A simulation starts only by a user's command, and a simulation model is built on parameters, which are regarded as a value chain. Therefore, Begg's teaching reads onto this limitation);

assembling a set of models in a memory that represent components of a value chain, wherein each of the models of said set includes one or more variables, where each of said one or more variables is defined on a corresponding range (p. 3 col. 1 section Components of SIAM System, all bullets in this col.), wherein at least one of the models of said set of models is a geocellular reservoir model (p. 5 col. 2 section Calibration paragraph 1);

selecting values of the variables in their respective ranges to create instantiated models (p. 3 col. 1 section Components of SIAM System, last bullet in this col.);

assembling the instantiated models into a workflow (p. 6 col. 1 section Implementation paragraph 1);

executing one or more simulation engines on the workflow to generate data output, wherein said executing is performed on the computer (p. 5 col. 1 paragraphs 2-3);

storing the selected values of the variables and the data output from the one or more simulation engines to a memory (p. 5 col. 1 paragraph 3);

but does not teach:

said selecting of values of the variables is based on a Latin Hypercube sampling of variables; and

the one or more simulation engines include including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics.

Netemeyer teaches at least one of the one or more simulations engines including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics (p. 1 paragraphs 0002, 0005).

Joshi teaches said selecting of values of the variables is based on a Latin Hypercube sampling of variables (pp. xlv, paragraph 4; p. xlv, paragraph 2).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Begg, Netemeyer, and Joshi. Netemeyer's and Joshi's teachings would have provided been useful in simulating a reservoir system that extends the discretized reservoir simulation model beyond reservoir to include nodes and connection for modeling fluid flow in the well tubulars and surface production and gathering lines, separators and pipelines (Netemeyer, p. 2 paragraph 0025) and accurately re-created an input distribution in less iteration, as compared to Monte-Carlo sampling (Joshi, paragraph 4; p. xlv, paragraph 2).

4. As per claim 3, Begg teaches repeating said selecting, said assembling the instantiated models, said executing, and said storing (p. 3 section Components of SIAM System bullet Fast, Simple Models. This paragraph teaches iteration of overall model including options and scenarios. This teaching means repeating the steps for different options and/or scenarios, so it reads onto this limitation).

5. As per claim 49, Begg teaches the data-output is useable to estimate reservoir (p. 5 col. 1 last paragraph).

**Claim 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Begg et al. in view of Netemeyer et al. and Joshi et al. as applied to claim 1 above and further in view of Voit et al. (Random Number Generation from Right-Skewed Symmetric, and Left-Skewed Distributions, 0272-4332/00/200-0059, 2000 Society for Risk Analysis).**

6. As per claim 7, Begg, Netemeyer, and Joshi do not teach said selecting of values of the variables includes computing quantiles of one or more user-specified probability distributions. However, Voit teaches computing quantiles of one or more user-specified probability distributions (p. 61 col. 2 section 3. S-Distribution in Monte Carlo Simulation paragraph 1).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Begg, Netemeyer, Joshi, and Voit. Voit's teachings would have provided access to uniformly distributed random numbers of sufficient quantity (p. 61 col. 2 section 3. S-Distribution in Monte Carlo Simulation paragraph 1).

7. As per claim 9, Begg, Netemeyer, and Joshi do not teach said selecting of values of the variables includes choosing a value in a user-specified quantile range  $[Q_A, Q_B]$  based on a probability distribution specified by a user for a first one of the variables, wherein A and B are integers between zero and 100 inclusive.

However, Voit teaches this limitation (p. 62 col. 2 section 4. Error Estimation paragraphs 1-2. In these paragraphs Voit teaches estimation errors in quantiles between 1<sup>st</sup> and 99<sup>th</sup> and

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then an example of selecting a value for h and g parameters in the 98<sup>th</sup> quantile. The teaching of estimating errors in specified quantiles indicates the intention to select values of parameters in those quantiles, illustrated in the example. Therefore, this teaching reads onto this limitation).

**Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Begg et al. in view of Netemeyer et al. and Voit et al.**

8. As per claim 10, Begg teaches a computer-implemented method comprising:

receiving input specifying a user's selection of one or more simulation engines associated with a value chain (p. 5 col. 1 paragraph 2);

assembling a set of models in a memory that represent components of the value chain, wherein each of the models of said set includes one or more random variables (p. 3 col. 1 section Components of SIAM System, all bullets in this col.), wherein at least one of the models of the set of models is a geocellular reservoir model (p. 5 col. 2 section Calibration paragraph 1);

instantiating the random variables of each model to determine instantiated models wherein said instantiating the random variables includes instantiating a value of a first one of the random variables (p. 3 col. 1 section Components of SIAM System, last bullet in this col.), wherein said value is instantiated in a quantile range  $[Q_A, Q_B]$  based on a user-specified probability distribution and user-specified integers A and B which are between zero and 100 inclusive;

assembling the instantiated models into a workflow (p. 6 col. 1 section Implementation paragraph 1);



executing the one or more simulation engines on the workflow to generate data output wherein said executing is performed on the computer (p. 5 col. 1 paragraphs 2-3); and

storing the data output from the one or more simulation engines to a memory (p. 5 col. 1 paragraph 3);

but does not teach:

wherein said value is instantiated in a quantile range  $[Q_A, Q_B]$  based on a user-specified probability distribution and user-specified integers A and B which are between zero and 100 inclusive; and

wherein the one or more simulation engines include one or more physics-based flow simulators for simulating reservoirs, wells and surface-pipeline hydraulics.

Netemeyer teaches at least one of the one or more simulations engines including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics (p. 1 paragraphs 0002, 0005).

Voit teaches said value is instantiated in a quantile range  $[Q_A, Q_B]$  based on a user-specified probability distribution and user-specified integers A and B which are between zero and 100 inclusive (p. 62 col. 2 section 4. Error Estimation paragraphs 1-2).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Begg, Netemeyer, and Voit. Netemeyer's and Voit's teachings would have provided been useful in simulating a reservoir system that extends the discretized reservoir simulation model beyond reservoir to include nodes and connection for modeling fluid flow in the well tubulars and surface production and gathering lines, separators and pipelines (Netemeyer, p. 2 paragraph 0025) and provided access to uniformly distributed random numbers of sufficient quantity (Voit, p. 61 col. 2 section 3. S-Distribution in Monte Carlo Simulation paragraph 1).

9. As per claim 12, Begg teaches repeating said selecting, said assembling the instantiated models, said executing, and said storing (p. 3 section Components of SIAM System bullet Fast, Simple Models).

**Claims 13 and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Begg in view of Netemeyer et al. and Joshi et al.**

10. As per claim 13, Begg teaches a computer-implemented method comprising:

computing an instantiated value of each random variable in a set of random variables (p. 3 col. 1 section Components of SIAM System, last bullet in this col.);

selecting a first geocellular reservoir model from a collection of geocellular reservoir models based on a first subset of the instantiated values (p. 3 col. 1 section Components of SIAM System, all bullets in this col. and p. 5 col. 2 section Calibration paragraph 1);

resolving uncertain dates for events in one or more schedules using a second subset of the instantiated values in order to determine resolved event dates (p. 2 col. 2 paragraph 2 from the bottom and p. 3 col. 2 paragraph 3 from the bottom. These paragraphs describe estimating timing for development plan These teachings are interpreted as reading onto this limitation);

executing a simulation engine on an input data set including the first reservoir model and the resolved events dates (p. 5 col. 1 paragraphs 2-3); and

capturing data generated by the simulation engine in response to said execution to a storage medium memory (p. 5 col. 1 paragraph 3);

However, Begg does not teach said computing is based on a Latin Hypercube sampling of the random variables and the simulation engine including one or more physics-based flow simulators for simulating reservoirs, wells and surface-pipeline hydraulics.

Netemeyer teaches at least one of the one or more simulations engines including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics (p. 1 paragraphs 0002, 0005).

Joshi teaches said selecting of values of the variables is based on a Latin Hypercube sampling of variables (pp. xlv, paragraph 4; p. xlv, paragraph 2).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Begg, Joshi, and Netemeyer. Netemeyer's teachings would have provided been useful in simulating a reservoir system that extends the discretized reservoir simulation model beyond reservoir to include nodes and connection for modeling fluid flow in the well tubulars and surface production and gathering lines, separators and pipelines (p. 2 paragraph 0025).

11. As per claim 15, Begg teaches the simulation engine including an economic computation engine (p. 2 col. 2 section Case and Scenario Management System paragraph 1).

12. As per claim 16, Begg teaches the input data set also includes a model of reservoir physical characteristics (p. 2 col. 2 section Case and Scenario Management System last paragraph).

**Claims 17-21, 23, 25, 27, and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Begg in view of Netemeyer et al. (U.S. Pub. 2002/0169785 A1) and Jalali et al. (U.S. Pub. 2002/0177955 A1).**

13. As per claim 17, Begg teaches a system comprising:

a memory storing program instructions and data (p. 5 col. 1 2<sup>nd</sup> paragraph from bottom.

This paragraph teaches using a computer in simulation which is a part of SIAM. This suggests a memory storing program instructions and data);

a processor configured to read the program instructions from the memory, wherein the program instructions are executable by the processor (p. 5 col. 1 2<sup>nd</sup> paragraph from bottom.

This paragraph teaches using a computer in simulation which is a part of SIAM. This suggests this limitation), the processor is operable to:

assemble a set of models, wherein each of the models of said set includes one or more variables, where each of said one or more variables is defined on a corresponding range (p. 3 col. 1 section Components of SIAM System, all bullets in this col.), wherein at least one of the models of said set of models is a geocellular reservoir model (p. 5 col. 2 section Calibration paragraph 1);

select values of the variables in their respective ranges to create instantiated models (p. 3 col. 1 section Components of SIAM System, last bullet in this col.);

assemble the instantiated models into a workflow (p. 6 col. 1 section Implementation paragraph 1); and

execute one or more simulation engines on the workflow (p. 5 col. 1 paragraphs 2-3);

but does not teach:

one of the one or more simulations engines including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics; and

execute a well-perforator program on one or more well plans included in the instantiated models in order to determine perforation locations for the one or more well plans.

Netemeyer teaches:

one of the one or more simulations engines including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics (p. 1 paragraphs 0002, 0005).

Jalali teaches execute a well-perforator program on one or more well plans included in the instantiated models in order to determine perforation locations for the one or more well plans (p. 9 paragraphs 0107-0108).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Begg, Jalali, and Netemeyer. Netemeyer's and Jalali's teachings would have been useful in simulating a reservoir system that extends the discretized reservoir simulation model beyond reservoir to include nodes and connection for modeling fluid flow in the well tubulars and surface production and gathering lines, separators and pipelines (Netemeyer, p. 2 paragraph 0025) and determined locations of perforation if needed (Jalali, p. 9 paragraph 0107).

14. As per claim 18, Begg teaches storing data output from the one or more simulation engines to the memory (p. 5 col. 1 paragraph 3).

15. As per claim 19, these limitations have already been discussed in claim 17. They are, therefore, rejected for the same reasons.

16. As per claim 20, these limitations have already been discussed in claim 18. They are, therefore, rejected for the same reasons.

17. As per claim 21, Begg teaches a computer-implemented method comprising:

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performing setup operations to assemble a case comprising a set of planning variables and models, wherein at least one of said models is a geocellular reservoir model (p. 3 col. 1 section Components of SIAM System, all bullets in this col.);

executing a calculation loop one or more times (p. 3 section Components of SIAM System bullet Fast, Simple Models. This paragraph teaches iteration of overall model including options and scenarios. This teaching means repeating the steps for different options and/or scenarios, so it reads onto this limitation), wherein each iteration of the calculation loop comprises:

automatically generating instantiations of the planning variables to determine instantiated models from the models (p. 3 col. 1 section Components of SIAM System, last bullet in this col.);

automatically executing one or more simulation engines on the instantiated models (p. 5 col. 1 paragraphs 2-3); and

automatically capturing the instantiated planning variables and output data from the one or more simulation engines onto a storage medium (p. 5 col. 1 paragraph 3);

but does not teach:

automatically executing well-perforator software on one or more well plans included in the instantiated models in order to determine perforation locations associated with the one or more well plans;

wherein the one or more simulation engines include one or more physics-based flow simulators for simulating reservoirs, wells and surface-pipeline hydraulics

Netemeyer teaches:

one of the one or more simulations engines including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics (p. 1 paragraphs 0002, 0005).

Jalali teaches execute a well-perforator program on one or more well plans included in the instantiated models in order to determine perforation locations for the one or more well plans (p. 9 paragraphs 0107-0108).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Begg, Jalali, and Netemeyer. Netemeyer's and Jalali's teachings would have been useful in simulating a reservoir system that extends the discretized reservoir simulation model beyond reservoir to include nodes and connection for modeling fluid flow in the well tubulars and surface production and gathering lines, separators and pipelines (Netemeyer, p. 2 paragraph 0025) and determined locations of perforation if needed (Jalali, p. 9 paragraph 0107).

18. As per claim 23, Begg teaches said capturing comprising storing the instantiated planning variables and simulation output data onto the storage medium in a relational database format (p. 5 col. 1 paragraph 3).

19. As per claim 25, Begg teaches the simulation engine including an economic computation engine (p. 2 col. 2 section Case and Scenario Management System paragraph 1).

20. As per claim 27, Begg teaches said performing setup operations including receiving user input specifying execution qualifying data corresponding to the case (p. 3 col. 1 last bullet. In

this paragraph, Begg teaches providing ranges to variables. These ranges are regarded as qualifying data corresponding to the case for the execution).

21. As per claim 29, Begg teaches the execution qualifying data includes a set of attainable values for each planning variable (p. 5 col. 1 last bullet. In this bullet Begg teaches entering ranges for uncertainty. These ranges can be for recovery factor or oil price. In this context, these ranges read onto this limitation).

22. As per claim 30, Begg teaches the execution qualifying data include data characterizing probability distributions for one or more of the planning variables (p. 16 Figure associated with Step 1. This step describes the simulation over a range of variable inputs to create complete PDF of output. It means a range of data input for generation of PDF, probability distribution, so this range of data input to characterize PDF, so it reads onto this limitation).

**Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Begg in view of Netemeyer et al. and Jalali et al. as applied to claim 21 above, and further in view of Voit et al.**

23. As per claim 24, Begg teaches said generating instantiations of the planning variables includes:

calculating a set of random numbers (p. 2, col. 1 paragraph 2. In this paragraph Begg teaches Monte Carlo simulation on models. This teaching suggests random variables),  
but does not teach calculating quantile values using the random numbers and user-defined probability distributions associated with the planning variables.



Voit teaches computing this limitation (p. 61 col. 2 section 3. S-Distribution in Monte Carlo Simulation paragraph 1).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Begg, Netemeyer, Joshi, and Voit. Voit's teachings would have provided access to uniformly distributed random numbers of sufficient quantity (p. 61 col. 2 section 3. S-Distribution in Monte Carlo Simulation paragraph 1).

**Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Begg in view of Netemeyer et al. and Jalali et al. as applied to claim 21 above, and further in view of Joshi.**

24. As per claim 28, Begg, Netemeyer and Jalali do not teach the execution qualifying data includes a number of iterations of the calculation loop. However, Joshi teaches this limitation (p. xlv 2<sup>nd</sup> paragraph from bottom).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Begg, Netemeyer, Joshi, and Voit. Voit's teachings would have been useful to check whether the simulation has converge and that further iterations will not substantially change the output distribution obtained (p. xlv 2<sup>nd</sup> paragraph from bottom).

**Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Begg.**

25. As per claim 31, Begg teaches a method comprising:

assembling a first case comprising a first set of models and planning variables for components of a value chain, in response to first user input, wherein the first set of models

and planning variables includes at least one geocellular reservoir model (p. 3 col. 1 section Components of SIAM System, all bullets in this col. and p. 5 col. 2 section Calibration paragraph 1);

assembling a second case by receiving second user input specifying modifications to the first set of models and planning variables and modifying the first set of models and planning variables according to said second user input (pp. 6-7 section Scenario Analysis);

storing the first case, the second case and the modifications to the first set of models and planning variables in a memory medium (p. 5 col. 1 paragraph 3);

conditionally displaying the modifications to the first set of models and planning variables in response to a user request (pages 4 col. 2 last paragraph, page 5 col. 1 paragraph 1, and page 5 col. 1 paragraph 1p. 5 col. 1 paragraph 3. In these paragraphs Begg teaches a data structure that keeps track of different scenarios and data associated with them and options and capability to display diagrams to be used to identify dependencies. These teachings suggest this claimed limitation).

Begg does not teach displaying an indication of the first case, the second case, and a parent child relationship between the first case and the second case. However, with the teaching of data structure keeping track of the data associated with the scenarios among scenarios taught on page 5 col. 1 paragraph 3 and the capability of graphically displaying diagram, taught on page 4 col. 2 last paragraph and page 5 col. 1 paragraph 1, one of ordinary skill in the art would have been able to generate a display for indication of the first case, the second case, and a parent child relationship between the first case and the second case to understand the structure of decision by clearly identifying dependencies.

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**Claims 42, 44-45, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Begg et al. in view of Netemeyer et al. and Jalali et al. (U.S. Pub. 2002/0177955 A1).**

26. As per claim 42, Begg teaches computer-implemented method comprising:

receiving user input characterizing probability distributions for planning variables associated with a set of models, wherein the set of models includes one or more geocellular reservoir models (p. 3 col. 1 section Components of SIAM System, all bullets in this col., p. 5 col. 1 paragraph 2 and col. 2 section Calibration paragraph 1);

generating instantiated values of the planning variables (p. 3 col. 1 section Components of SIAM System, last bullet in this col.);

assembling one or more input data sets for one or more simulation engines from the set of models and the instantiated values (p. 3 col. 1 section Components of SIAM System, all bullets in this col.), wherein said assembling includes resolving uncertain event dates in one or more schedules included in the set of models based on a first subset of the instantiated values (p. 3 col. 2 paragraph 3 from the bottom. This paragraph describes estimating timing for development plan models and also providing timing for production. This teaching is interpreted as reading onto this limitation);

executing the one or more simulation engines on the one or more input data sets (p. 5 col. 1 paragraphs 2-3); and

storing the instantiated values of the planning variables and data output from the one or more simulation engines to a storage medium (p. 5 col. 1 paragraph 3);

but does not teach:

executing a well perforator program based on a second subset of the set of models and a second subset of the instantiated values;

wherein the one or more simulation engines include one or more physics-based flow simulators for simulating reservoirs, wells and surface-pipeline hydraulics.

Netemeyer teaches at least one of the one or more simulations engines including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics (p. 1 paragraphs 0002, 0005).

Jalali teaches automatically execute a well-perforator program on one or more well plans included in the instantiated models in order to determine perforation locations for the one or more well plans (p. 9 paragraphs 0107-0108).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Begg, Netemeyer, and Jalali. Netemeyer's and Jalali's teachings would have provided been useful in simulating a reservoir system that extends the discretized reservoir simulation model beyond reservoir to include nodes and connection for modeling fluid flow in the well tubulars and surface production and gathering lines, separators and pipelines (Netemeyer, p. 2 paragraph 0025) and determined locations of perforation if needed (Jalali, p. 9 paragraph 0107).

27. As per claim 44, Begg teaches performing said generating, assembling, executing, and storing a number of times until termination condition is achieved (p. 3 section Components of SIAM System bullet Fast, Simple Models. This paragraph teaches iteration of overall model including options and scenarios. This teaching means repeating the steps for different options and/or scenarios, so it reads onto this limitation).

28. As per claim 45, Begg teaches executing a reservoir model-scaling engine to scale one or more geocellular reservoir models of said set of models to a lower resolution (p. 3, col. 2, section Simplified Domain Models, paragraph 1, and p. 5 col. 2 paragraph 2).

29. As per claim 48, Begg teaches a computer-implemented method comprising:

- receiving user input characterizing a set of planning variables associated with a set of models (p. 5 col. 1 paragraph 2);

- generating instantiated values of the planning variables (p. 3 col. 1 section Components of SIAM System, last bullet in this col.);

- assembling a first input data set using a first subset of the instantiated values and a first subset of the set of models (p. 3 col. 1 section Components of SIAM System, all bullets in this col.), and assembling a second input data set using a second subset of the instantiated values and a second subset of the set of models (pp. 6-7 section Scenario Analysis), wherein the first subset of the set of models includes a geocellular reservoir model (p. 5 col. 2 section Calibration paragraph 1);

- determining instantiated schedules using a third subset of the instantiated values and a third subset of the models, and appending the instantiated schedules to the first input data set and the second input data set (p. 5 col. 1 paragraph 2. In this paragraph Begg teaches using a model to calibrate the SIAM component models, estimate uncertainty in their input parameters. This teaching reads onto this limitation);

- executing one or more physics-based flow simulators on the first input data set to generate flow data for oil, gas and water and appending the flow data to the second input data set (p. 5 col. 1 paragraph 2 and col. 2 section Generating Simple Surrogates);

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executing an economic computation engine on the second input data set to generate economic output data (p. 2 col. 2 last paragraph. This paragraph suggests an economic simulator to plan and manage uncertainty);

storing the instantiated values of the planning variables, the flow data and the economic output data to a storage medium in a relational database format (p. 5 col. 1 paragraph 3); and

repeating (b), (c), (d), (e), (f), (g) and (h) until a termination condition is achieved (p. 3 section Components of SIAM System bullet Fast, Simple Models. This paragraph teaches iteration of overall model including options and scenarios. This teaching means repeating the steps for different options and/or scenarios, so it reads onto this limitation).

Begg does not teach:

executing a well-perforator program to determine well perforation locations for wells in the first input data set, and appending the well perforation locations to the first input data set;

executing one or more physics-based flow simulators, wherein the one or more physics-based flow simulators are configured to simulate reservoirs, wells and surface-pipeline hydraulics; and

Jalali teaches limitation executing a well-perforator program to determine well perforation locations for wells in the first input data set, and appending the well perforation locations to the first input data set (p. 9 paragraphs 0107-0108).

Netemeyer teaches at least one of the one or more simulations engines including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics (p. 1 paragraphs 0002, 0005).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Begg, Jalali, and Netemeyer. Netemeyer's and Jalali's teachings would have been useful in simulating a reservoir system that extends the discretized reservoir simulation model beyond reservoir to include nodes and connection for modeling fluid flow in the well tubulars and surface production and gathering lines, separators and pipelines (Netemeyer, p. 2 paragraph 0025) and determined optimum segmentation for the well (Jalali, p. 9 paragraph 0107).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cuong V. Luu whose telephone number is 571-272-8572. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah, can be reached on 571-272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. An inquiry of a general nature or relating to the status of this application should be directed to the TC2100 Group receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

***/Cuong V Luu/***

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**Examiner, Art Unit 2128**

/Hugh Jones/

Primary Examiner, Art Unit 2128